

# Amine Destruction - a 'Right First Time' solution

Technology  
for a  
Sustainable Future

ERG owned company Beverley Environmental are often called upon to provide complex and dynamic solutions to clients' environmental emissions problems.

## Application

Through their European project team, Nigeria Liquid Natural Gas Company (NLNG) were looking for a solid waste incinerator to handle their domestic solid waste (and looking for advice on how to handle an Amine contaminated aqueous stream) at their Bonny Island refinery. Beverley Environmental were able to offer a two chamber pyrolyzing design of incinerator with automatic feed and de-ashing system for the solid waste. Included in the package was a bag filter unit for dust handling.



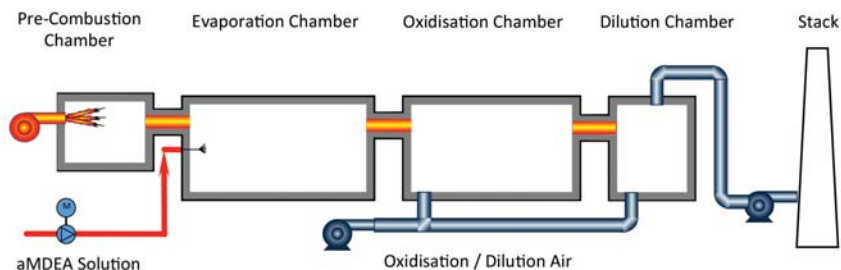
But as the project proceeded, it became clear that the amine-aqueous stream was Methyl Di Ethyl Amine. The Beverley engineering department advised against destructing this in the solid waste incinerator and passing it through the bag filter.

It was agreed that an alternative and dynamic solution was required to deal with the resultant problems - these being: -

- Combustion of aMDEA in an oxidising chamber would result in very high NO<sub>x</sub> formation - at brown smoke level.
- The amine slush solution was mainly water and so, would not in itself generate a stable flame, could quench the existing flame and would absorb any UV light, thereby triggering the UV flame scanner to 'flame out'.

## System Description

The final solution proposed was a 'four chamber - one unit' solution.



- The pre-combustor contained the gas burner firing sub-stoichiometrically to reduce NO<sub>x</sub> formation.
- The evaporation chamber contained the amine slush gun and atomiser ensured the aqueous solution was converted to a dry vapour.
- The Oxidiser chamber was of sufficient dimensions to allow 3 sec residence time to destruct the MDEA to hydro carbons and molecular nitrogen (N<sub>2</sub>).
- The dilution chamber quenched the gases for emission to atmosphere.



When it came to the expansion of the refinery in 2000 and 2006, Nigeria LNG named Beverley Environmental as contractor of choice for the MDEA destruction solution. The only change to the design for the new units was due to the flow rate being increased by a factor of 2.5. Beverley had offered a 'right first time' design solution.

The ERG Maintenance and Spares department continues to support the customer with spares parts and service visits for the larger units.